WATERMARKING USING IMAGE PROCESSORS

BACKGROUND

[0001]   Watermarks are frequently displayed in the background of printed material, e.g., as an identifier of the printed material, such as for security purposes, for aesthetics, etc. Many watermarked printed materials are produced using digital technology. For example, digital data corresponding to a watermark is often added to digital data corresponding to printed material, such as a printed document, using an external computer to create a digital representation of a watermarked document. The computer then sends the digital representation of the watermarked document to a printer in a printer-usable format for printing the watermarked document.

[0002]   Some digital image-processing devices, such as digital copiers, etc., are capable of adding watermarks to a printed document without the use of an external computer. Typically, a watermark is either scanned into the image-processing device or is entered into the image-processing device, for example, using a keyboard or a card reader of the image-processing device. The image-processing device converts the watermark into digital data. Then, the image-processing device scans the printed document to which the watermark is to be added and converts the printed document into digital data. The image-processing device adds the digital data corresponding to the watermark to the digital data corresponding to the printed document to create a digital representation of a watermarked document. Then, the image-processing device converts the digital representation of a watermarked document to a printer-usable format and prints out a watermarked document. However, many of these image-processing devices use complex user interfaces that require a user to navigate a number of menus to produce the watermarked document.

SUMMARY

[0003]   One embodiment of the present invention provides a method of operating an image processor. The method includes printing a control document indicative of one or more watermarks. Scanning the control document to detect a user mark designative of a selected one of the one or more watermarks is also included in the method, as is scanning printed material. The method also includes adding data corresponding to the selected one of the one or more watermarks to data corresponding to the scanned printed material to form data corresponding to watermarked material.

DESCRIPTION OF THE DRAWINGS

[0004] Figure 1 is a block diagram of an image processor according to an embodiment of the present invention.

[0005] Figure 2 illustrates a control document according to another embodiment of the present invention.

[0006] Figure 3 is a flowchart of a method according to another embodiment of the present invention.

DETAILED DESCRIPTION

[0007] In the following detailed description of the present embodiments, reference is made to the accompanying drawings that form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that process, electrical or mechanical changes may be made without departing from the scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims and equivalents thereof.

[0008] Figure 1 is a block diagram of a digital image processor 100, such as a digital copier, digital sender, multifunction copier, etc., according to an embodiment of the present invention. Image processor 100 includes a scanner 110 connected to a digitizer 120, such as an analog-to-digital converter. A controller 130 is connected to digitizer 120. For one embodiment, scanner 110 scans in printed material, such as a printed document, and converts the printed material into analog electrical signals. Digitizer 120 receives the analog electrical signals from scanner 110 and converts the analog electrical signals into digital data. Digitizer 120 sends the digital data to controller 130.

[0009] For one embodiment, controller 130 is adapted to format the data received from scanner 110 into a printer-usable format, such as a bitmap, Portable Document Format (PDF), Tag Image File Format (TIFF), Joint Photographic Experts Group (JPEG), etc. For one embodiment, controller 130 is adapted to transmit digital data corresponding to the scanned printed material, e.g., in a printer-usable format, to one or more destination addresses on a

data network via an interface 140. For one embodiment, the destination addresses are network addresses of network devices (printers, servers, workstations, storage devices, etc.), electronic messaging addresses (e.g., email), facsimile (fax) numbers, etc., and the data network is a Local Area Network, the Internet, or the like.

[0010]   For another embodiment, digital image processor 100 includes a printer 150, such as a laser printer, an ink-jet printer, etc., connected to controller 130. For one embodiment, controller 130 is adapted to send the printer-usable data to a printer 150 for printing. For another embodiment, printer 150 includes a supply of printable media 152, such as paper, on which a copy of the printed material is printed.

[0011]   Controller 130 includes a memory 132, e.g., a computer-usable storage media that can be fixedly or removably attached to digital image processor 100. Some examples of computer-usable media include static or dynamic random access memory (SRAM or DRAM), read-only memory (ROM), electrically-erasable programmable ROM (EEPROM or flash memory), magnetic media and optical media, whether permanent or removable. Memory 132 may include more than one type of computer-usable media for storage of differing information types.

[0012]   In various embodiments, memory 132 stores digital data received from digitizer 120 for subsequent formatting by controller 130. For another embodiment, memory 132 contains computer-readable instructions, e.g., drivers, adapted to cause a processor 134 of controller 130 to format the data received from digitizer 120 and computer-readable instructions to cause processor 134 to cause digital image processor 100 to perform various methods, as described below. For one embodiment, image processor 100 includes a user interface 160 that in another embodiment includes a graphical display 162.

[0013]   Figure 2 illustrates a watermark control document 200 according to another embodiment of the present invention. For one embodiment, printer 150 of image processor 100 prints out control document 200 on the printable media when a user of image processor 100 activates a control-document print key 164 (Figure 1) of user interface 160. For another embodiment, control-document print key 164 is integrated in display 162.

[0014]   For one embodiment, control document 200 includes a watermark section 210. Watermark section 210 displays thumbnails 212_1 to 212_N of images that can be added as watermarks to printed material that is scanned into image processor 100. The watermark

section, for another embodiment, can include more than one page of control document 200, depending on the number and/or size of thumbnails 212. For some embodiments, thumbnails 212 are thumbnails of images, such as pictures, text, logos, etc., that were pre-scanned into image processor 100 and stored as data, corresponding to the pre-scanned images, in memory 132 of image processor 100.

[0015]   For other embodiments, thumbnails 212 are thumbnails of images stored as data in a removable storage media 166 (shown in Figure 1) removably connectable to image processor 100. Examples of storage media 166 include flash memory cards (e,g., CompactFlash available from SanDisk Corporation, Sunnyvale, California, USA, and Memory Stick available from Sony Corporation, Japan), floppy disks, compact discs, Universal Serial Bus (USB) drives, etc. For one embodiment, image data corresponding to the images stored in storage media 166 is stored in memory 132 before the thumbnails 212 are printed. For another embodiment, the images stored in storage media 166 are printed as thumbnails 212 directly from storage media 166.

[0016]   For another embodiment, open symbols 214_1 to 214_N, e.g., circles, ellipses, boxes, etc., are respectively disposed adjacent thumbnails 212_1 to 212_N. To add a watermark to printed material scanned into image processor 100, a thumbnail 212 corresponding to the image that is to be added as a watermark is designated by a user making a mark adjacent the thumbnail 212, e.g., by placing the mark within the symbol 214 corresponding to the thumbnail 212. For example, to add the image corresponding to thumbnail 212_1 to the printed material, the user places a mark 216 in symbol 214_1, as shown in Figure 2.

[0017]   For another embodiment, watermark control document 200 includes a display options section 220 that can include scaling options 222, brightness options 224, orientation options 226, a color option 228, a black-and-white option 230, etc. The display options provide various options for displaying an image as a watermark on printed material. For one embodiment, an open symbol 232, e.g., a circle, an ellipse, a box, etc., is disposed adjacent each of the display options. For another embodiment, a user places mark 216 in one or more open symbols 232 corresponding to the one or more display options to be selected. For example, when marks 216 are placed within open symbols 232 as shown in Figure 2 and are scanned into image processor 100, image processor displays the image corresponding to thumbnail 212_1 on the printed material in color, at 70 percent of its original size, at ten

percent of its original brightness, and rotated 90 degrees counterclockwise from its original position.

[0018] For another embodiment, watermark control document 200 includes an output options section 240 that can include an option for printing watermarked copies of the printed material at printer 150 and/or sending the watermarked copies a destination address, such as an email address, fax number, website address, etc. For one embodiment, an open symbol 242, e.g., a circle, an ellipse, a box, etc., is disposed adjacent each of the output options. For another embodiment, a user places mark 216 in one or more open symbols 242 corresponding to the one or more output options to be selected. For example, when marks 216 are placed within open symbols 242 as shown in Figure 2 and are scanned into image processor 100, image processor prints out one or more copies of watermarked printed material and sends data corresponding to the watermarked printed material to a preprogrammed email address *1*, a preprogrammed fax number *P*, a preprogrammed website address *1*, and a destination address, such as a website address, fax number, and/or email address, that is entered in a space 246, e.g., by typing, of the output options section 240. For one embodiment, an optical character recognition (OCR) program stored in memory 132 causes processor 134 to interpret the destination address in region 246 and to send the watermarked printed material to that destination address.

[0019] For another embodiment, watermark control sheet 200 includes an indicator 250, such as a bar code, that when detected by image processor 100, places image detector 100 in a watermark mode of operation. For other embodiments, user activation of a watermark-mode-selection key 168 (Figure 1) of user interface 160 places image processor 100 into the watermark mode of operation. For another embodiment, watermark-mode-selection key 168 is integrated in display 162. For various embodiments, while operating in the watermark mode, image processor 100 adds a watermark corresponding to a selected one of thumbnails 212 to printed material that is scanned by image processor 100. For one embodiment, position vectors (not shown) originating at indicator 250 specify the locations of thumbnails 212, each of the display options, each of the output options, and open symbols 214, 232, and 242, and thus each of marks 216 relative to indicator 250. For example, indicator 250 may be the origin of a coordinate system, e.g., Cartesian coordinate system, and the position vectors row or column vectors having as elements coordinates of the locations or bounding regions of

the respective thumbnails 212, display options, output options, and open symbols 214, 232, and 242.

[0020]   For various embodiments, the computer-readable instructions of image processor 100 cause image processor 100 to perform a method 300, as illustrated by a flowchart in Figure 3. At block 310, image processor 100 prints out watermark control document 200, e.g., in response to a user activating control-document print key 164. For some embodiments, this involves image processor 100 generating the thumbnails 212 from data corresponding to images in memory 132 and/or removable memory 166. Image processor 100 then adds the thumbnails to an electronic version of watermark control document 200 that is in a printer-usable format.

[0021]   After printing watermark control document 200, the user places a mark 216 adjacent a thumbnail 212 to designate the thumbnail 212 as corresponding to a selected watermark. For example, the user fills in an open symbol 214 corresponding to the thumbnail 212 with mark 216. At block 320, image processor 100 scans control document 200 to detect the mark 216. For one embodiment, image processor 100 detects the indicator 250 before detecting mark 216, which instructs image processor to operate in the watermark mode of operation. For another embodiment, the user places image processor 100 in a watermark mode of operation using watermark-mode-selection key 168 before control document 200 is scanned.

[0022]   Upon detecting mark 216, image processor 100 selects an image, e.g., from memory 132 or removable memory 166, corresponding to the designated thumbnail 212 as a watermark to be added to printed material. For other embodiments, image processor 100 detects marks 216 corresponding to the various options for displaying the selected image on the printed material and/or the various options for outputting the watermarked printed material.

[0023]   At block 330, the printed material is scanned by scanner 110 while image processor 100 is in the watermark mode of operation. At block 340, data corresponding to the selected image to be added as a watermark is added to data corresponding to the printed material to form data corresponding to watermarked material. For one embodiment, the data corresponding the watermarked material is converted to a printer usable format. For another embodiment, this includes implementing one or more display options of the display options section 220 as a result of image processor detecting marks 216 corresponding to the one or

more display options. For one embodiment, printer 150 prints the watermarked material as a result of image processor detecting a mark 216 corresponding to the output option (or print instruction) "Print Watermarked Copies." For some embodiments, image processor 100 sends the data corresponding to the watermarked printed material to one or more destination addresses specified in the output options section 240 as a result of image processor 100 detecting marks 216 corresponding to the one or more destination addresses.

CONCLUSION

[0024]   Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement that is calculated to achieve the same purpose may be substituted for the specific embodiments shown. Many adaptations of the invention will be apparent to those of ordinary skill in the art. Accordingly, this application is intended to cover any adaptations or variations of the invention. It is manifestly intended that this invention be limited only by the following claims and equivalents thereof.